

Effects of Varied Types of Live Feed Organisms and Pelleted Feed on Food Utilization in Clown Fish, *Amphiprion sebae* with Special Reference to in Captivity

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Abstract: Effects of varied types of live feed organisms on food utilization of clown fish, *Amphiprion* were studied. The juvenile (5 ± 1 cm size) *Amphiprion* were used for various feed trials. Moina, Brachionus, Artemia and Daphnia reared from laboratory tanks and the pelleted feed with 40% dietary protein prepared in our laboratory were used as experimental feeds. The physicochemical parameters like salinity 32-36 ppt, pH 7.8 - 8.2, ammonia less than 1% were maintained. The results obtained from the feed trials indicated that the various food utilization parameters respond to the variation in the type of live feed organisms. Fishes fed with moina showed the highest values of growth parameters (feeding rate 284 ± 5 absorption rate 202 ± 9 and conversion rate 99 ± 6 J/g live fish day) whereas the lowest values were found in the fish fed with pelleted feeds. Among different levels of dietary proteins studied, the maximum growth (366 ± 5 J/g live fish day) was observed in fishes fed pelleted diets having 45% of dietary protein.

Key words: Brood stock • Clown fish • Water quality and Estuarine water

INTRODUCTION

Aquaculture animals have to obtain all their nutritional requirements except for part of the mineral requirements through the food they consume [1]. Live feeds have gained much importance in not only the larval rearing systems, but also in grow out systems. The initial source of food is probably associated with the size of the larvae at the time of hatching. Live feeds help restore the water quality of the culture system whereas compounded feeds may cause deterioration if not managed properly. The presence of live organisms in the aquatic system creates a conducive natural environment and they are more easily accepted by cultured organisms. Some of the ciliates which are used as live feed consume the fine organic matter thereby reducing the organic load of the system [2]. There is abundant distribution of *Amphiprion* spp in Gulf of Mannar. But, very little work has been done on the acclimation and bioenergetics of commercially important marine ornamental fishes like the clown fish, *Amphiprion sebae*. Hence, in the present study, the impact of different types of live feeds on the growth parameters of *Amphiprion sebae* was investigated.

MATERIAL AND METHODS

Juveniles of *Amphiprion sebae* (4.5 ± 0.5 g) were wild collected from Gulf of Mannar and acclimated to laboratory conditions in glass aquaria. The juveniles were distributed among the tanks at a stocking density of 5 fish /tank with treatments in triplicate. The physico-chemical characters of the aquarium water were maintained as per the levels shown in table 1. During acclimation period, fish were fed on pelletised artificial feed prepared lay square method of food compounding [3]. The ingredients used for the feed preparation were groundnut oil cake, rice bran, dried fish, dried silkworm pupae and tapioca flour. Five types of feeds-pellet feeds, daphnia, artemia, *Brachionus* and moina were used during the experimental studies. The test animals were fed twice a day at 6.00 to 8.00 hr in the evening at the rate of 15% of their body weight.

The fed acceptance was monitored everyday. After the 2 Hr feeding period the food remains in the trough was collected using pipette without disturbing fish and the actual food consumption was calculated. The culture medium was changed daily to give constant effect of water qualities on fish. At the time of changing the culture

Table 1: Physico chemical characters of marine water

Parameters	Optimum level
pH	7.8-8.2
Salinity	32-36
Temperature	27°-32°C
Alkalinity	<120ppm
Dissolved Oxygen	>5ml/l
Ammonia	<0.01ppm
Nitrite	<0.01ppm
Photoperiod	12hrs/day

medium the entire tank water was filtered for the collection of faeces. The faeces were dried at 95°C and weighed. The rearing experiments were conducted for a period of 60 days. On the final day the test animals weighed in live condition, killed and dried to constant weight. The dry weight of the test individuals was also estimated. The food utilization scheme was worked out as per the modified form of IBP formula [4]. The formula adopted in the present study was C=P+M+F whereas C represented the amount of food consumed; P, Production (or) growth; M, Energy loss due to metabolism and F, Faeces.

The food consumption was determined by subtracting the dry weight of the imfed materials from the dry weight of the food given and expressed in mg dry food consumed per g live fish per day. Food absorption was determined by subtracting the faeces from the total food consumed by the fish. The feeding rate, absorption rate and growth rate were calculated by using the following formulae

$$\text{Feeding rate} = \frac{\text{Total dry food consumed}}{\text{Number of days} \times \text{Initial live weight of fish}}$$

$$\text{Absorption rate} = \frac{\text{Total food absorbed}}{\text{Number of days} \times \text{Initial live weight of fish}}$$

Table 2: Effects of different types of feeds on feed utilization in Clown fish, *Amphiprion* spp. Each value in the average ($X \pm SD$) performance of respective type of feeds in 3 aquaria with six immature fish (5±1 cm size) maintained for 30 days at 28 ±2°C. The rates are expressed in J/g live fish/ day and efficiencies are expressed in percentage

Parameters	Types of feed				
	Moina	Brachionus	Artemia	Daphnia	Pelleted feed
Feeding rate	284±5 a	221±7	185±6	168±4	112±8 a2
Absorption rate	202±9	180±5	146±3	140±5	91±2
Conversion rate	99±6	96±4	69±5	63±3	46±4
Absorption Efficiency	32±2 b	31±3	30±2 b1	32±3	33±2 b2
Conversion Efficiency	11±1 c	10±2	9±1 c1	8±2	7±1 c2

a vs a1- Not significant

a1 vs a2 – Highly significant

b vs b1- Not significant

b1 vs b2 – Not significant

c vs c1- Not significant

c1 vs c2 – Highly significant

$$\text{Growth rate} = \frac{\text{Total gain in body weight}}{\text{Number of days} \times \text{Initial live weight of fish}}$$

$$\text{Metabolic rate} = \text{Absorption rate} - \text{Growth rate}$$

The percentage of absorption and conversion efficiencies were calculated as follows:

$$\text{Absorption efficiency} = \frac{\text{Food absorbed}}{\text{Food consumed}} \times 100$$

$$\text{Growth conversion efficiency (K}_1\text{)} = \frac{\text{Growth rate}}{\text{Feeding rate}} \times 100$$

$$\text{Net conversion efficiency (K}_2\text{)} = \frac{\text{Growth rate}}{\text{Absorption rate}} \times 100$$

RESULTS AND DISCUSSION

Effects of different types of feeds on feed utilization in *Amphiprion* are shown in table 2. The highest feeding rate of 284 J/g live fish/day was observed, while the test fishes were fed with moina. Similarly the fish fed with pelleted feed exhibited the lowest feeding rate of 112J/g live fish/day. Similar trend was observed in other feed parameters like absorption rate and conversion rate (Table 2). But, the absorption efficiency showed the opposite trend. For example, the fishes fed with pelleted diets had the highest absorption efficiency (33%) whereas the fishes fed with the Brachionus showed the lowest efficiency in absorption (31%). The analysis for crude protein in the chosen experimental feeds showed that moina contained 45%, Brachionus contained 40%, Artemia 40%, Daphnia 35% and the pelleted feed also contained 35%. The highest level of protein content in

Summary of analysis of variance for the data on the rates of feedings, absorption and conversion in relation to the types of feeds in Clown fish, *Amphiprion* spp.

Parameter	Source of variance	SS	Df	MS	F.ratio	P*
Feeding rate	Total	171537	10	5915		
	Groups	170203	2	42551	265	<0.01
	Error	1334	8	53		
Absorption rate	Total	127641	10	4401		
	Groups	125474	33	31367	120	<0.01
	Error	2163	8	86		
Conversion rate	Total	40166	9	1385		
	Groups	38745	11	9686	57	<0.01
	Error	1421	8	56		

P* - Highly significant

moina may be one of the reasons for the better growth performance of *Amphiprion* fed with moina. Even though Brachionus and Artemia were found to contain some level of protein there was significant variation in the feeding rate of *Amphiprion* fed on Brachionus (332J/g live fish/day) and Artemia (277J /g live fish/day). Similarly dietary protein level of daphnia and pelleted feed were same (65%). But, intake of experimental feeds differed in the fishes tested with Daphnia (252 J/g live fish /day) and pelleted feed (168 J/g live fish /day). These observations suggest that *Amphiprion* is more sensitive to the type of feed used at the time of captive rearing.

REFERENCES

1. Pillay, T.V.R., 1995. Aquaculture principles and practices, pp: 92-156.
2. Castell, J.D., 1996. Aquaculture nutrition In Realism in Aquaculture : Achievements, Constraints, Perspectives, (Ed. By M.Bilio, H.Rosenthal and C.J. Sindermann), pp: 251-308. European Aquaculture Society, Bredene, Belgium.
3. Hardy, R., 1980. Fish feed formulation. In Fish Feed Technology, pp: 111 - 170 ADCP/REP/80/ 11,FAO, of the UN, Rome.
4. Petrusewicz, K. and A. Macfadyen, 1970. IBP handbook, number 13 (Blackwell Scientific Publications,Oxford), pp: 190.